TITLE

PERLAKUAN BENIH DENGAN RIZOBAKTERI UNTUK MENGENDALIKAN PATOGEN DAMPING OFF DAN SEBAGAI RIZOBAKTERI PEMACU PERTUMBUHAN TANAMAN (RPPT) PADA TANAMAN CABAI MERAH (CAPSICUM ANNUUM L.)

ABSTRACT

RINGKASAN
Ratnawati. Perlakuan Benih dengan Rizobakteri untuk Mengendalikan Patogen Damping Off dan Sebagai Rizobakteri Pemacu Pertumbuhan Tanaman (RPPT) pada Tanaman Cabai Merah (Capsicum annuum L.) dibawah bimbingan Syamsuddin sebagai ketua dan Syafruddin sebagai anggota.

Penelitian ini bertujuan untuk (1) mengeavaluasi daya hambat rizobakteri terhadap pertumbuhan koloni patogen Pythium sp secara in vitro, dan karakterisasi fisiologis rizobakteri sebagai kandidat agens antagonis dan pemacu pertumbuhan tanaman serta mengevaluasi kemampuan isolat rizobakteri untuk memproduksi senyawa siderofor dan hidrogen sianida (HCN), produksi IAA, dan melarutkan fosfat (P), (2) mengevaluasi pengaruh inokulasi rizobakteri pada benih sebagai pemacu pertumbuhan tanaman terhadap proses perkecambahan dan pertumbuhan bibit Cabai merah, (3) mengevaluasi pengaruh inokulasi rizobakteri pada benih sebagai rizobakteri pemacu pertumbuhan tanaman terhadap pertumbuhan vegetatif dan produksi dua varitas tanaman cabai di lapangan, (4) untuk mengetahui pengaruh interaksi antara perlakuan benih sebelum tanam dengan rizobakteri dan varietas terhadap pertumbuhan vegetatif dan produksi tanaman cabai di lapangan.

Penelitian dilaksanakan di Laboratorium Ilmu dan Teknologi Benih, Kebun Percobaan Program Studi Agroteknologi, Laboratorium Penyaki Tanaman, Program Studi Proteksi Tanaman, dan Kebun Percobaan Fakultas Pertanian Universitas Syiah Kuala Darussalam Banda Aceh, serta Laboratorium Bakteriologi Fakultas Kedokteran Hewan IPB Bogor. Penelitian berlangsung dari bulan Januari 2016 sampai Juni 2016. Percobaan daya hambat rizobakteri terhadap pertumbuhan koloni pathogen terbawa benih secara in vitro menggunakan rancangan acak lengkap menggunakan tiga kali ulangan. Sementara analisis karakter fisiologis rizobakteri (produksi IAA, Siderofor, HCN, dan kemampuan melarutkan fosfat) tidak menggunakan rancangan percobaan. Sedangkan percobaan perlakuan benih dengan rizobakteri terhadap viabilitas dan vigor kekuatan tumbuh benih cabai merah menggunakan rancangan percobaan acak lengkap (RAL) non faktorial dengan menggunakan tiga kali ulangan. Pengamatan meliputi potensi tumbuh maksimum, daya berkecambah, indeks vigor, keserempakan tumbuh, kecepatan tumbuh relatif, dan T50. Percobaan pengaruh perlakuan benih dengan rizobakteri terhadap pertumbuhan bibit cabai menggunakan rancangan acak lengkap non factorial dengan tiga kali ulangan. Parameter yang diamati meliputi tinggi bibit, jumlah daun dan berat kering biomasa bibit umur 45 HST. Efektivitas perlakuan benih dengan rizobakteri terhadap pertumbuhan dan hasil cabai merah di lapangan menggunakan rancangan acak kelompok (RAK) faktorial. Faktor yang diteliti yaitu 2 varietas tanaman cabai dan 8 isolat rizobakteri. Percobaan diulang tiga kali. Parameter yang diamati tinggi tanaman dan diameter batang pada umur 30 dan 45 hari setelah pindah tanam, jumlah cabang (30 HST), jumlah cabang produktif (60 HST), produksi (jumlah buah per tanaman dan bobot buah per tanaman (5 kali panen).

Hasil penelitian menunjukkan bahwa hasil evaluasi kemampuan menghambat rizobakteri terhadap pertumbuhan koloni patogen Phytium sp. secara in vitro terdapat 4 isolat yang mempunyai daya penghambatan sangat tinggi (>75%) yaitu isolat rizobakteri Azotobacter sp., B. megaterium B. laterophorus, dan B. coagulans. Sementara 2 isolat mempunyai daya penghambatan tinggi (61-75%) yaitu Necercia sp. dan B. bodius. Perlakuan benih pra tanam dengan rizobakteri pemacu pertumbuhan tanaman isolate Actinotorbacter, A. suis, Azotobacter sp., B. alvei, P. capacia, B. pilymixa dan B.stearothermophillus memberikan peningkatan viabilitas dan vigor kekuatan tumbuh benih lebih baik. Pada pertumbuhan bibit umur 6 minggu setelah tanam, perlakuan benih pra tanam dengan rizobakteri secara umum memberikan nilai posistif terhadap peningkatan pertumbuhan bibit, isolat Actinotorbacter sp. secara konsisten memberikan efek peningkatan samapai pada fase pertumbuhan bibit. Hasil pengamatan pada parameter pertumbuhan vegetatif dan produksi tanaman, perlakuan benih pra tanam menggunakan isolat rizobakteri Flavobacterium sp. relatif lebih baik dibandingkan perlakuan lainnya. Perlakuan benih pra tanam menggunakan isolat rizobakteri Azotobacter sp.secara efektif mampu meningkatkan hasil tanaman cabai berdasarkan jumlah buah produksi per tanaman. Varietas PM999 ternyata lebih unggul dibadingkan varietas Kiyo F1. Pertumbuhan relatif lebih tinggi pada varietas PM999 pada perlakuan benih dengan Flavobacterium sp, varietas Kiyo F1 pada perlakuan benih dengan Azotobacter. Varietas PM999 diperoleh produksi tertinggi, apabila perlakuan benih dengan rizobakteri Flavobacterium sp, sedangkan varietas Kiyo F1 produksi tertinggi menggunakan isolat B. alvei.

Kata Kunci: Isolat, Varietas, Pseudomonas capasia dan Pseudomonas dimuta, Produksi

SUMMARY

Ratnawati. Seeds Treatment using Rizobacteria to Control Damping Off Pathogens and as a Growth Booster on Red Chili Plants (Capsicum annuum L.), supervised by Syamsuddin as the first supervisor and Safruddin as the second supervisor.

This experimental was aimed to (1) evaluating the inhibitory power of rhizobacteria against the growth of Pythium sp pathogenic colonies using in vitro method, and physiological characterization of rhizobacteria as candidates for antagonistic agents and improve plant growth and evaluate the ability of rhizobacterial isolates to produce ciderofor and hydrogen cyanide (HCN) compounds, IAA production, and phosphate solvents (P), (2) the effect of rhizobacteria inoculation on seeds as a trigger for plant growth in germination and growth process of red chili seedlings, (3) evaluated the effect of rhizobacteria inoculation on seeds as growth booster rhizobacteria in vegetative fase and production in two varieties chilli, (4) to determine the effect of interaction between seed treatment before planting with rhizobacteria and varieties on vegetative growth and production of chili plants in the field.

The research was conducted in Laboratory of Seed Science and Technology, the Experimental Garden of Agrotechnology Department, Laboratory of Plant Disease, Plant Protection Department, and the Experimental Garden of Agriculture Faculty, University of Syiah Kuala Darussalam Banda Aceh, and Laboratory of Bacteriology, Veterinary Faculty, Bogor Agricultural Institute. The research took place from June 2015 to December 2015. Experiments of rhizobacterial inhibitory power on the growth of pathogenic colonies carried by seeds in vitro using a completely randomized design using three replications. The analysis of physiological character of rhizobacteria (production of IAA, Siderofor, HCN, and the ability to dissolve phosphate) does not use experimental designs. The experimental treatment of seeds with rhizobacteria on the viability and vigor of the growing strength of red chilli seeds using randomized complete with non factorial pattern and three replications. The observations include maximum growth potential, germination power, vigor index, growth simultaneity, relative growth speed, and T50. The effect of seed treatment with rhizobacteria on the growth of chilli seedlings Experiments using a randomized complete design with non factorial pattern and three replications. Parameters observed included seedling height, number of leaves and dry weight of seed biomass aged 45 HST. The effectiveness of seed treatment with rhizobacteria on growth and yield of red chili in the field using factorial randomized block design.

The factors studied were 2 varieties of chili plants and 8 isolates of rhizobacteria. The experiment has three replication. Parameters observed were plant height and stem diameter at 30 and 45 days after transplanting, number of branches (30 HST), number of productive branches (60 HST), production (number of fruits per plant and fruit weight per plant (5 harvests).

The results showed that there were 4 isolates that had a very high inhibitory power (> 75%) on the evaluation of the ability to inhibit rhizobacteria against the growth of pathogenic colonies Phytium sp. in vitro, namely Azotobacter sp., B. megaterium B. laterophorus, and B. coagulans While 2 isolates have high inhibitory power (61-75%), namely Necercia sp. and B. bodius. Pre-planting seed treatments with plant growth-promoting rhizobacteria isolates Actinotorbacter, A. suis, Azotobacter sp., B. alvei, P. capacia, B. pilymixa and B. stearothermophillus provide improved viability and vigor to grow seeds better. In the growth of seedlings aged 6 weeks after planting, pre-planting rhizobacteria seed treatment generally provides positive value for increasing seedling growth, isolates of Actinotorbacter sp. consistently increase until the seedling growth phase. The results of vegetative growth parameters observations and yieldst production, pre-planting seed treatment using rhizobacterial isolates of Flavobacterium sp. relatively better than other treatments. Pre-planting seed treatments using rhizobacterial isolates Azotobacter sp. were effectively able to increase the yield of chili plants based on the number of fruit produced per plant. Variety of PM999 were superior compared to variety of Kiyo F1. The plant growth relatively higher in variety of PM999 on seed treatment with Flavobacterium sp, and seed treatment with Azotobacter on variety of Kiyo F1. Variety of PM999 obtained the highest production, when the seed treatments with rhizobacteria Flavobacterium sp, while the variety of Kiyo F1 produced the highest using B. alvei isolates.

Keywords: Isolates, Varieties, Pseudomonas capasia and Pseudomonas dimuta, Production